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COMPREHENSIVE WATER QUALITY PROJECT CHESAPEAKE BAY - SUSQUEHANNA RIVER BASINS (PROSPECTUS)

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PROSPECTUS

Comprehensive Water Quality Project

Chesapeake Bay - Susquehanna River Basins

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U. S. Dept. of Health, Education, and Welfare
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INTRODUCTION

The United States Public Health Service, Department of Health, Education, and Welfare, has long recognized the need for a comprehensive water quality study of the Chesapeake Bay Drainage Basin including the Susquehanna River Basin. There are current problems of water supply and pollution control which adversely affect the optimum utilization of the Basin's water resources for municipal and industrial uses, recreation, fisheries, and other beneficial uses. In addition to pollution resulting from disposal of municipal and industrial wastes, drainage from active and abandoned coal mines is a significant pollution contributor in the Project area. Increasing population and economic and industrial development are constantly adding to these problems. A thorough study of the current situation and the probable future development is necessary to the formulation of a program to insure optimum water quality management. Such a study would not only involve the co-ordinated efforts of many Federal, State, and local agencies, but also public and private institutions, and industrial and commercial organizations whose interests are directed to the most efficient development, utilization, and management of the Basin's enormous water resources.

Under its authority for developing comprehensive programs for water pollution control, as set forth in the Federal Water Pollution Control Act (P.L. 660) and the Federal Water Pollution Control Act Amendments of 1961 (P.L. 87-88), the USPHS, DHEW, has initiated a comprehensive water quality project for the Chesapeake Bay Drainage Basin. This project is one of a

series of regional 1/ projects designed to develop comprehensive programs for water quality management which will alleviate current problems and meet the requirements of future years.

This prospectus describes the purpose, scope, and concepts, and outlines the elements and general organization of the study which is designed to collect necessary information and data and to formulate a comprehensive water quality management program.

PURPOSE AND SCOPE

The purpose of the project will be to acquire as complete a knowledge as possible of the water quality conditions of the Basins and the factors which will determine the future water quality, and based upon this knowledge, to develop a program to improve, protect, and preserve the quality of surface, ground and coastal water for all beneficial uses during the next 50 years. This project will be concerned with present and projected water requirements for domestic, municipal and industrial purposes and with the management of the quality of water resources for public health, community growth, industrial and commercial development, recreation, fish, wildlife, and agriculture.

The project seeks the active co-operation of Federal, State, and local agencies and envisions the utilization of all available data which would contribute to the study. The project will involve correlative and co-operative studies with state governmental agencies having an interest in water resource

1/ These include the following current basin projects: Columbia River, Arkansas-White-Red Rivers, Colorado River, Illinois River and Great Lakes, Delaware River, and Tri-State Metropolitan and Hudson River.

development. Also, studies will be made in co-operation with Federal agencies such as Corps of Engineers, Department of the Army, U. S. Geological Survey, Department of the Interior, and the Department of Agriculture. In addition, public and private institutions will be consulted in order to utilize all available competencies on the subject.

The resultant reports will supplement other available reports and studies of such agencies as Corps of Engineers for flood control, navigation and hydroelectric power; the Department of Agriculture for the development of small watersheds; and others.

The end result will be alternate proposals and recommendations which will serve as a framework to aid Federal, interstate, state, and local jurisdictions in planning, developing, and co-ordinating future water resource management programs. The comprehensive reports will delineate problem areas and suggest possible solutions; project population and economic growth; predict future water supply and related waste disposal requirements; outline water quality objectives and propose means of meeting those objectives; point out the needs, benefits, and costs for stream flow regulation; suggest research studies or projects necessary to increase knowledge in specific fields of interest. In the development of these reports, careful attention shall be given to maintaining a balance between the engineering, economic, and planning aspects of long range comprehensive programming.

GENERAL DESCRIPTION

The geographic area to be considered is that drained by the Chesapeake Bay and its tributaries, a land area of approximately 67,000 square miles. This area includes almost all of Maryland, about 65 percent of Virginia,

CHESAPEAKE BAY DRAINAGE BASIN

50 percent of Pennsylvania, and about 12 percent of both New York and West Virginia. Residing in the Basin are approximately ten million people, two-thirds of whom live in urban areas.

The Chesapeake Bay geologically is the drowned mouth of the Susquehanna River and the largest tidal estuary in the United States. It ranges from 4 to 40 miles in width and stretches over 200 miles in length. The tidal shoreline of the Bay and its tributaries totals approximately 5600 statute miles, compared to the nation's continental shoreline of only about 4840 statute miles. About 80 percent of the Basin is drained by the Susquehanna, Potomac and James Rivers.

The Susquehanna, the largest river on the Atlantic Coast of the United States, has a basin area of 27,000 square miles. This river flows from its headwaters in New York State, across Pennsylvania, to enter the Chesapeake Bay in Maryland.

The Potomac River system, beginning in the Appalachian Mountains of West Virginia and Maryland and the Shenandoah Valley of Virginia, drains an area of 14,700 square miles. This tributary provides the National Capital Area with an excellent waterway to the Chesapeake Bay. The North Branch and the main stem of the Potomac form the southern boundary of the State of Maryland.

The James River rises in the Allegheny Mountains and flows in a southeasterly direction across central Virginia draining 10,000 square miles before entering the Chesapeake Bay at Hampton Roads.

About 60 percent of the Chesapeake Bay Basin is woodland while approximately 30 percent is cropland and pasture. The climate is generally one of

warm, humid summers and moderate winters. Severe storms are infrequent and prolonged droughts are rare. Snowfall varies from 10 inches in the Coastal Plain to 50 inches in the mountains. The annual average rainfall of about 42 inches is fairly uniformly distributed throughout the year and is generally sufficient for agricultural needs.

Population within the Basin has been increasing at a rate well above the national average. Estimates from census figures for the past several decades are as follows:

Year	Urban	Rural	Total
1920	--	--	6,100,000
1930	--	--	6,600,000
1940	--	--	7,254,000
1950	5,463,000	3,058,000	8,521,000
1960	6,730,000	3,400,000	10,130,000

This population is largely concentrated in rapidly growing industrial and metropolitan areas. Standard Metropolitan Statistical Area Populations within the Basin as reported by the Department of Commerce, Bureau of Census, are as follows:

Area	1950	1960
Binghamton, N. Y.	184,693	212,661
Harrisburg, Pa.	292,241	345,071
Scranton, Pa.	257,396	234,531
Wilkes-Barre, Pa.	392,241	346,972
Baltimore, Md.	1,405,399	1,727,023

Area (Con't.)	1950	1960
Lancaster, Pa.	278,359	235,717
York, Pa.	238,336	202,737
Altoona, Pa.	137,270	139,514
Washington, D. C.	1,464,089	2,001,897
Lynchburg, Va.	96,936	110,701
Newport News-Hampton, Va.	154,977	224,503
Norfolk-Portsmouth, Va.	446,200	577,504
Richmond, Va.	328,050	408,494

A unique and dominant feature of the Basin is the location of the seat of National Government within its limits. The population and economic growth of the National Capital Area will continue to influence the economy to a large degree.

Manufacturing in the Basin ranges from small-scale seasonal food processing plants to huge industrial complexes producing steel, chemicals and electrical equipment. Furniture, metal products, textiles, glass, paper, and leather products are all manufactured in the Basin.

Much of the nation's import-export trade centers around the Chesapeake Bay. Located on its shores are Baltimore, Maryland, and Norfolk and Newport News, Virginia, three of the most active seaports in the world. In addition to intra-coastal shipping, approximately 51,689,000 long-tons of foreign water-borne trade were handled by these harbors in 1960, or about 35 percent of the total foreign tonnage for the Atlantic Coast.

The Basin supports a widely diversified agricultural economy. Dairy farming predominates in northern Pennsylvania, while the Delmarva Peninsula is noted for poultry and truck farming. While the Coastal Plain is known for

its crops of tobacco and peanuts, the Shenandoah Valley of Virginia is a leading apple producing region.

Minerals also contribute to the economy of the Basin. Practically all of the anthracite coal used in the United States is mined in the Susquehanna sub-basin in Pennsylvania. Bituminous coal and natural gas are important natural resources of the sub-basin. Virginia is among the nation's leaders in the production of manganese and soapstone, found in the mineral deposits of the James River sub-basin. Stone and sand quarrying operations are prevalent throughout the entire Basin area.

The Chesapeake Bay supports the most productive fishing per unit of area on the Atlantic Coast, and contains the most extensive and prolific oyster beds in the world. Estuaries indent the shoreline where the combination of brackish waters, suitable temperature, and abundance of food makes high reproduction and rapid growth of shellfish possible. During the last several years, however, municipal and industrial pollution has resulted in the closure of some valuable oyster beds.

The Chesapeake Bay is the most important recreational area in the Basin. Accomplished yachtsmen have termed it, "the greatest inland body of water in the world." Boats of all types and sizes can be found on the Bay. Vacationers and sportsmen alike are drawn to this natural playground during all seasons of the year.

The entire Basin is rich in recreational resources including beaches, mountains, and lakes. Fishing for game fish such as striped bass, sea trout, croaker, flounder, drum, shad, perch, and spot is a major sport in the Bay and its tributaries. Tourists are attracted to the many historical centers

of the Basin, including Williamsburg, Mount Vernon, Fort McHenry, Gettysburg, and Bull Run. Campers and nature lovers can find relief from urbanization in the Basin's numerous National and State parks.

BASIC CONCEPTS

Water resources development is the planning and providing for the optimum utilization of water for all purposes. Water supply and water quality management is one of several of the important facets of water resources development. Lacking a basin-wide authority or guide for water resource development, the project envisions the need for careful co-ordination of the efforts of many agencies in the most efficient way possible to produce a comprehensive program to guide control agencies in the management of water supply and water quality and to guide construction agencies in planning facilities which will insure required reliable flows. Where necessary, this project will provide the co-ordination for water supply and water quality management.

There are indications that the water supply requirements in future years will be so great that they can be met only by the most efficient use of all available sources including the reclamation of used water. Further developments in desalinization of brackish water may provide yet another source to meet these future needs.

Water quality management involves two major activities: (1) control of polluting wastes and (2) stream flow regulation. The latter should be a supplement, not a substitute, for waste treatment in water quality control.

The primary emphasis must be on waste treatment. This is especially true in tidal basins.

The difficulty of maintaining or restoring water quality is continually increasing because of the growing quantity and variety of pollutants affecting our water courses. New technological developments are contributing new kinds of wastes which will have an impact on the Basin's water resources. Although present knowledge will provide the solution to many situations, there is a need to develop new knowledge to solve problems associated with these basins. Therefore, an evaluation of research requirements will be considered by the project.

ELEMENTS

Listed below are five major elements of the project. The development of these elements will be accomplished through studies as outlined in the organization of the project.

1. Determination of existing quantity and quality of water resources; accomplished through inventory and field studies to collect data concerning water uses, supply available from all sources, waste discharges, treatment facilities, measurable quality parameters and related water rights of the users.

2. Determination of future water requirements and pollutional loads; accomplished through studies which make projections of population growth and economic development, translated into forecasts of future water uses and waste discharges.

3. Analysis of the existing and projected water resource status; to determine the problems and effects to be dealt with in a program for water quality management.

4. Development of a water quality management program; presenting recommendations for meeting projected water requirements and satisfying water quality objectives in the future.

5. Identification of research requirements; related to specific existing or anticipated problems where adequate knowledge is lacking.

ORGANIZATION OF THE PROJECT

In the organization of this comprehensive water quality project, it has been necessary to consider the magnitude and complex nature of the Chesapeake Bay Drainage Basin. The inherent characteristics of the area can be most effectively dealt with by subdividing the whole Basin into its major sub-basins. The project will produce a series of reports for each of the several sub-basins in the area. These reports will be used as the basis for a comprehensive water quality program for each sub-basin which will then be combined to provide an over-all program for the Chesapeake Bay Drainage Basin. Incremental planning is not only feasible and applicable in view of the current project requirements and aims, but is most readily adapted to future development of comprehensive water quality management programs for the Basin.

The major sub-basins of the Chesapeake Bay Drainage Basin are listed below:

1. Susquehanna River
   (a) Main Stem
   (b) West Branch
   (c) Juniata River
   (d) Chemung River
2. Gunpowder-Patapsco-Back Rivers
3. Patuxent River
4. Potomac River
5. Rappahannock River
6. York River
7. James River

8. Chesapeake Bay-Maryland
9. Chesapeake Bay-Virginia

The Chesapeake Bay-Maryland will include the shoreline, islands, creeks, embayments, coastal waters, and small river sub-basins within the Maryland portion of the Chesapeake Basin, not included in other sub-basins.

The Chesapeake Bay-Virginia will include the shoreline, islands, creeks, embayments, coastal waters, and small river sub-basins within the Virginia portion of the Chesapeake Basin, not included in other sub-basins.

The various investigations which will be undertaken in each basin study are discussed in the subsequent portions of this statement of project organization. These investigations will be concerned with the several elements previously outlined.

Economic Studies and Projections - These studies will establish the existing economic base in the project area including population, employment and other aspects of the economy. An evaluation of the growth potential of the Basins will provide an index for projection of the levels of population and expansion of industry, agriculture, commerce, and recreation in the project area during the next 50 years. Homogeneous economic areas may not coincide with sub-basins boundaries so that adjustments will be made where necessary.

These economic studies and projections will be directed primarily at determining the future need for water resource goods and services and will take into account the extent to which future economic development is related to the efficient utilization of the Basin's water resources.

Water Resource Inventories - These inventories will collect data on quantity and quality of surface and ground water sources, quantity and characteristics of wastes, and extent of present usage of water resources in the Basins.

Water quantity investigations will utilize geologic information to determine the location, dependability and amount of available ground water supplies. Surface water sources will be analyzed from detailed hydrologic data to determine location, amount and variations due to seasonal effects. Additional information will be collected concerning existing, proposed and potential surface water storage facilities.

Another study will be concerned with information on brackish water in the project area upon which to base an evaluation of desalinization processes to meet the future water supply needs of the Basin.

A review of existing water rights will be made as a supplement to the above inventories.

Water quality investigations will include inventories of source, amount, and characteristics of wastes loads from municipalities and industries. It will involve the collection of data regarding present and proposed sewerage facilities. In addition, information on pollution attributable to agriculture, commerce, and recreation will be obtained.

Information will be required on physical, chemical, bacteriological, and other related characteristics of both fresh and brackish surface water as well as ground waters. Existing water quality data supplemented where necessary through field studies will provide this information.

Oceanographic data will be collected to provide a basis upon which to predict the effect of the discharge of the wastes into the Bay and its tidal estuaries.

A detailed inventory will be prepared to provide data on the existing water uses and users in the Basin. This will include source, quantity, and

quality, type of treatment, planned expansion, and proposed future source of supply. In connection with this inventory, a tabulation will be made of the size and location of approved and prohibited shellfish growing areas.

Field Investigations - Analysis of inventories, economic studies, and suggestions from advisory committees will serve as a basis for determining the scope and amount of field investigations required. These investigations will be instigated to update and supplement existing information as well as to provide additional data.

Wherever possible, these field studies will be accomplished by those agencies or organizations most competent in the specific technical field concerned. It is intended to make the most efficient use of the resources of all participants in the project, through co-operative and contractual arrangements.

Existing state and local laboratory facilities will be utilized where feasible, but the work load and nature of special studies indicate the desirability of the project operating its own field laboratories. This is particularly true in the case of the tidal estuary studies to be undertaken by the project's Oceanographic Section.

Water Quality Program - A comprehensive water quality program will be prepared based on the information obtained through the analysis of economic projections, water resource inventories, and special field investigations. The factors involved will include predictions of future water resource capabilities to satisfy these projected needs. The report will delineate the various potential uses, and the program will be designed to provide an efficient means of insuring optimum utilization of the water resources.

Control of pollution at its source will be a primary feature of the program and effective utilization of current waste disposal technology will be recommended as the first step in all cases. Where, after waste treatment has been provided, needs exceed available resources, economic feasibility studies will be made for alternate methods of preserving, protecting, and supplementing these resources. Alternates may include storage, flow regulation, and desalinization.

Evaluation of information will undoubtedly disclose areas where knowledge is inadequate. From this, research needs will be identified and probable means of implementing the necessary research will be explored, described, and encouraged. Fundamental research in the field of waste treatment must be advanced to provide increased efficiency and to develop means for the removal of secondary pollutants such as nutrients and detergents.

In the formulation of the program, all existing pollution control laws and policies will be examined and changes may be suggested if they appear desirable from the standpoint of basin-wide effective water quality control.

In addition, an evaluation of current sampling activities will be made for the purpose of establishing a comprehensive monitoring program to provide complete and continuous information for effective management of the Basin's water resources.

Comprehensive water quality planning is a dynamic process. Continual co-operative co-ordination is vital to the success of this project. Ever changing conditions must be reflected in each element of the project. Effective communications must be established and maintained in order that adjusted requirements may be reflected in the final recommendations of this water quality program for the Basin.